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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/240,632	02/01/1999	YUTAKA MURAKAMI	402/568	7584

7590

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EXAMINER

FAN, CHIEH M

ART UNIT PAPER NUMBER

2634

DATE MAILED: 12/10/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

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Office Action Summary

Application No.

09/240,632

Applicant(s)

MURAKAMI ET AL.

Examiner

Chieh M Fan

Art Unit

2634

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 26 September 2002.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,3-13,33 and 36-73 is/are pending in the application.
- 4a) Of the above claim(s) 60-73 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,3-13,33 and 36-59 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 2/1/99 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☒ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) g.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

1. Applicant's election without traverse of Group I, claims 1, 3-13, 33 and 36-59 in Paper No. 10 is acknowledged.

Priority

2. Receipt is acknowledged of the uncertified copy of the priority documents submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file. The applicants indicated, in the amendment received 6/3/02 (PTO Paper #7), that the required certified copy of the priority documents was submitted on February 18, 1999. The applicants also indicated the postcard receipt and the transmittal document were attached in the amendment as a proof. However, the examiner cannot find such postcard receipt and transmittal document in the amendment. Therefore, 35 U.S.C 119(a)-(d) conditions are not met unless the applicants submit the postcard receipt/transmittal document or the certified copy of the priority documents.

Claim Objections

3. Claims 41-48 and 52-59 are objected to under 37 CFR 1.75(c) as being in improper form because a multiple dependent claim cannot not depend from any other multiple dependent claim. See MPEP § 608.01(n). Accordingly, the claims 41-48 and 52-59 have not been further treated on the merits.

Specification

4. The disclosure is objected to because of the following informalities: "12D" in line 9 of page 20 should be ---12E---.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

5. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

6. Claims 1, 3-13, 36 and 38-48 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

Regarding claims 1, 3-13 and 36, it appears that claims 1, 3-13 and 36 are directed to embodiments 19-23 of the instant application. The first modulation in the above-mentioned embodiments is either 2^{2m} QAM (where $m \geq 2$) or 8PSK. Therefore, the first modulation is at least 8-signal-point modulation. The specification clearly does not teach that the first modulation is at least 4-signal-point modulation as recited in claim 1. Further, if the first modulation becomes 4-signal-point modulation, i.e., 4QAM or QPSK, then the first modulation and the second modulation will be the same, i.e., QPSK. As a result, the object of the instant application (page 1) will clearly not be met.

Regarding claims 38-48, it is not clear how a second modulation signal may contain data and a pilot symbol as recited in claim 38. The examiner acknowledges that the applicants indicate that the pilot symbol also carries a part of the main information to be transmitted (page 26, lines 6-7). However, since the second modulation in the instant application is either QPSK (i.e., 2-bit symbol) or BPSK (i.e., 1-bit symbol), it is not clear how a 2-bit symbol or a 1-bit symbol may contain both data and pilot symbol as recited in the claim.

7. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

8. Claims 6-13 and 49-59 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding claims 6-13, the limitation "the at least 8-signal-point modulation" in recited in claims 6, 7, 9 and 13 has insufficient antecedent basis.

Regarding claims 49-59, claim 49 recites "a quadrature baseband signal" twice in lines 2-3 and 5-6. It is not clear if the two occurrences of "a quadrature baseband signal" are referred to the same signal. Further, the limitation "the second modulation signal pilot signal" in lines 2-3 of claim 50 is awkward and not understood.

Claim Rejections - 35 USC § 102

9. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

10. Claim 33 is rejected under 35 U.S.C. 102(b) as being anticipated by Furuya (US Patent 5,577,087).

Furuya teaches a transmission apparatus comprising:

first means for regularly (60 and 30 in Fig. 4; also see Fig. 2 and col. 3, lines 3-6, the blocks numbered 1, 2 of a signal frame are using QPSK and the blocks numbered 3, 4 are using 16QAM) subjecting an input digital signal (input to 70 in Fig. 4) to first modulation (40 in Fig. 4) and second modulation (50 in Fig. 4) to convert the input signal into pair of a baseband I signal and a baseband Q signal (note that the outputs of

16QAM and QPSK have I and Q components), the first modulation being at least 8-point-signal modulation, and the second modulation being phase shift keying; and

second means for outputting the pair of the baseband I signal and the baseband Q signal (the outputs of 40 and 50 are sent to radio section 20 for converting to radio frequency and then sent to the antenna 10 for transmitting).

11. Claims 33, 37 and 49-51 are rejected under 35 U.S.C. 102(b) as being anticipated by Seki et al. (EP 0734132 A2, provided by the applicants in IDS received 8/2/02, PTO Paper # 8).

Regarding claim 33, Seki et al. teaches a transmission apparatus comprising:

first means (see 11 in Fig. 3, also see col. 10, lines 16-20) for regularly subjecting an input digital signal to first modulation and second modulation to convert the input signal into pair of a baseband I signal and a baseband Q signal, the first modulation being at least 8-point-signal modulation, and the second modulation being phase shift keying (the first modulation is 16QAM and the second modulation is QPSK, also see col. 18, lines 39-49 and col. 7, lines 10-11)

second means (see 14 in Fig. 3) for outputting the pair of the baseband I signal and the baseband Q signal.

Regarding claim 37, Seki et al. also teaches that the variations in amplitude and phase of a channel are detected from the QPSK signal (col. 11, lines 6-7; col. 13, lines 4-13)

Regarding claims 49 and 50, Seki et al. teaches a transmission apparatus comprising a first multi-value modulation system for subjecting an input digital signal to first modulation and outputting a quadrature baseband signal, a second modulation system producing a second modulation signal as a pilot regularly inserted into the multi-value modulation system for subjecting the input digital signal to second modulation and outputting a quadrature baseband signal, wherein the pilot signal includes a pilot symbol for estimating a frequency offset and a channel distortion, and wherein amplitude and phase distortion amounts of a receiver are derived from the second modulation signal. (See col. 7, lines 46-58; col. 10, lines 16-22; col. 8, line 57 through col. 9, line 10; col. 13, lines 4-13; and col. 16, lines 50-58. Note that since the QPSK signal is used to detect the amplitude offset and the phase offset, the QPSK signal is considered to be a pilot signal.)

Regarding claim 51, Seki et al. also teaches that the second modulation signal, i.e., QPSK signal, is differentially encoded (col. 1, lines 20-35).

Claim Rejections - 35 USC § 103

12. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

13. Claim 37 is rejected under 35 U.S.C. 103(a) as being unpatentable over Furuya (US Patent 5,577,087) as applied to claim 33 above, and further in view of Alamouti et al. (US Patent 5,933,421).

As described above, Furuya teaches the claimed subject matter except the symbols provided by the phase shifting comprises a pilot symbols for estimating at one of (1) a transmission path distortion and (2) a frequency offset.

Alamouti et al. teaches a communication system, wherein pilot symbols are inserted in the QPSK symbols to be transmitted (col. 15, lines 42-48). The pilot symbols are used to provide an accurate representation of the channel response, i.e. the amplitude and phase distortion introduced by the communication characteristics (col. 12, lines 58-63).

It is known in the art that the channel distortion needs to be estimated and removed or compensated in the receiver such the received signal can be accurately demodulated to recover the transmitted data. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide pilot symbols in the QPSK signal of Furuya to estimate the channel distortion, such that the received signal can be accurately demodulated to recover the transmitted data at the receiver.

14. Claims 49 and 50 are rejected under 35 U.S.C. 103(a) as being unpatentable over Furuya (US Patent 5,577,087) in view of Alamouti et al. (US Patent 5,933,421).

Furuya teaches a transmission apparatus comprising a first multi-value modulation system (40 in Fig. 4) for subjecting an input digital signal to first modulation and outputting a quadrature baseband signal, a second modulation system (50 in Fig. 4) producing a second modulation signal inserted into the multi-value modulation system for subjecting the input digital signal to second modulation and outputting a quadrature baseband signal (note that the outputs of 16QAM and QPSK have I and Q components).

Furuya does not teach that the second modulation signal is used as a pilot signal to derive the amplitude and phase distortion amounts of a receiver.

Alamouti et al. teaches a communication system, wherein pilot symbols are inserted in the QPSK symbols to be transmitted (col. 15, lines 42-48). The pilot symbols are used to provide an accurate representation of the channel response, i.e. the amplitude and phase distortion introduced by the communication characteristics (col. 12, lines 58-63).

It is known in the art that the channel distortion needs to be estimated and removed or compensated in the receiver such the received signal can be accurately demodulated to recover the transmitted data. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide pilot symbols in the QPSK signal of Furuya to estimate the channel distortion, such that the received signal can be accurately demodulated to recover the transmitted data at the receiver.

15. Claim 51 is rejected under 35 U.S.C. 103(a) as being unpatentable over Furuya (US Patent 5,577,087) in view of Alamouti et al. (US Patent 5,933,421) as applied to claims 49 and 50 above, and further in view of Wong (US Patent 5,027,372).

Furuya in view of Alamouti et al. teaches all the subject matter of the claimed limitation except that the PSK modulation is differential phase shift keying (DPSK). However, DPSK is a well-known variation of basic PSK modulation technique. It has been long practiced in the art. Wong teaches that the use of DPSK instead of PSK would have the advantage of not needing to transmit a phase reference (col. 2, lines 25-26). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use DPSK instead of PSK in the system of Furuya, such that a reference phase is not required.

16. Claims 38-40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Seki et al. (EP 0734132 A2, provided by the applicants in IDS received 8/2/02, PTO Paper # 8) in view of Alamouti et al. (US Patent 5,933,421).

Regarding claim 38, Seki et al. teaches a modulation method comprising:
generating a first multi-value modulation signal having multi-value symbols with a first multi-value modulation system (see "QAM information symbol" in Fig. 3);
generating a second modulation signal estimating at one of (1) a channel distortion and (2) a frequency offset for demodulating said multi-value modulation signal (see "QPSK information symbol" in Fig. 3, also see col. 8, line 57 through col. 9, line 10; col. 11, lines 6-8; col. 13, lines 4-13; and col. 16, lines 50-58); and

inserting said second modulation signal as a pilot signal into said multi-value modulation signal (col. 10, lines 16-20; col. 10, lines 16-22).

Seki et al. does not teach that the second modulation signal containing data and pilot symbol.

Alamouti et al. teaches a communication system, wherein pilot symbols are inserted in the QPSK symbols to be transmitted (col. 15, lines 42-48). The pilot symbols are used to provide an accurate representation of the channel response, i.e. the amplitude and phase distortion introduced by the communication characteristics (col. 12, lines 58-63).

As indicated by Seki et al., the QPSK symbols can only be used to detect phase variation within $\pm 45^\circ$ in the interval at which the QPSK symbols are transmitted (col. 8, line 59 through col. 9, line 2). On the other hand, a pilot symbol can be used to provide an accurate representation of the channel response (see Alamouti et al., col. 12, lines 58-63) and has no phase offset detection limit. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to insert pilot symbols in the QPSK symbols of Seki et al. to improve the accuracy phase offset detection, and consequently improve the accuracy of demodulation of the received signal.

Regarding claim 39, Seki et al. also teaches deriving at one of (1) channel distortion and (2) a frequency offset for a receiver from the pilot signal (col. 13, lines 4-13; and col. 16, lines 50-58).

Regarding claim 40, Seki et al. also teaches that the second modulation signal, i.e., QPSK signal, is differentially encoded (col. 1, lines 20-35).

Conclusion

17. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Chieh M Fan whose telephone number is (703) 305-0198. The examiner can normally be reached on Monday-Friday 8:00AM-5:30PM, Alternate Fridays off.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen Chin can be reached on (703) 305-4714. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9314 for regular communications and (703) 872-9314 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 305-4750.

Chieh M Fan 
Examiner
Art Unit 2634

cmf
December 4, 2002


STEPHEN CHIN
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2600